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UNITED STATES DEPARTMENT OF AGRICULTURE  
WASHINGTON, D. C.DEVELOPMENT OF POWDERY MILDEW RESISTANT  
CANTALOUPE NO. 45

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## ORIGIN

In 1925 powdery mildew (*Erysiphe cichoracearum* DC.) suddenly appeared in destructive form on cantaloupes and other forms of muskmelons (*Cucumis melo* L.) in the Imperial Valley of California, which is by far the leading melon district of the country. Fungicides proved of little value, and the crop was seriously injured for several succeeding seasons.

In 1926 the late J. T. Rosa<sup>1</sup> and the senior author undertook the development of mildew-resistant melons. Following the untimely death of Dr. Rosa in 1928 his place in the project was taken by the junior author. With the introduction in 1936 of Powdery Mildew Resistant Cantaloupe No. 45, the powdery mildew problem in Imperial Valley seems to have been largely solved for cantaloupes, but commercially satisfactory mildew-resistant strains of Honey Dew, Honey Ball, and other less important types are not yet perfected.

In searching for mildew resistance, melon varieties and strains from all parts of the world were grown in the Imperial Valley in 1926, 1927, and 1928 without finding anything of promise until 1928. That season numerous plants in several mixed varieties from India remained entirely free from mildew throughout the season, whereas other plants of the same varieties and all plants of many other varieties were badly mildewed. Unfortunately the fruits on all mildew-free plants were commercially useless because of poor shipping and eating qualities. Crosses were then made with several leading American varieties. Mildew resistance was found to be inherited as a simple Mendelian dominant factor. This made feasible backcrossing the hybrids with American varieties, which pro-

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cedure has apparently hastened the development of strains combining the mildew resistance of the Indian varieties and the desirable shipping and eating qualities of the American varieties.

The complete pedigree of Powdery Mildew Resistant Cantaloup No. 45 is as follows:

- Step 1. Resistant plant (ribbed melon with slight netting, poor flesh) in a variety from India crossed with Hale Best, 1928
- Step 2.  $F_1$  resistant selection (promising small cantaloup) open-pollinated, spring 1929.
- Step 3.  $F_2$  resistant selection (large elongated cantaloup) backcrossed with Hale Best, fall 1929.
- Step 4.  $F_1$  (from backcross) resistant selection (promising medium-sized cantaloup) open-pollinated, spring 1930.
- Step 5.  $F_2$  resistant selection (fair large cantaloup) self-pollinated, fall 1930.
- Step 6.  $F_3$  homozygous resistant population (cantaloups of variable size, shape, and quality) mass selected to give Powdery Mildew Resistant Cantaloup No. 50, spring 1931.
- Step 7.  $F_4$  resistant selection (good oblong cantaloup, fair netting) from Powdery Mildew Resistant Cantaloup No. 50 open-pollinated, spring 1932.
- Step 8.  $F_5$  resistant selection (good oblong cantaloup, fair netting) open-pollinated, fall 1932.
- Step 9.  $F_6$  resistant selection (good oblong cantaloup, very good netting) open-pollinated, spring 1933.
- Step 10.  $F_7$  resistant selection (good oblong cantaloup, good netting) self-pollinated, fall 1933.
- Step 11.  $F_8$  homozygous resistant population (good cantaloups of uniform size, shape, and quality) mass selected to give Powdery Mildew Resistant Cantaloup No. 45, spring 1934.

As indicated, one of the resistant plants from India was crossed with the Hale Best variety; an  $F_2$  selection from this cross was then backcrossed with Hale Best, and finally a homozygous resistant  $F_3$  (from the backcross) population was mass selected to give Powdery Mildew Resistant Cantaloup No. 50. This variety was grown commercially to a limited extent, but the melons were quite variable in size, shape, and quality. Starting with a selection from No. 50, four additional generations of selecting produced Powdery Mildew Resistant Cantaloup No. 45. Many of the selections were open-pollinated as indicated in the pedigree. However, the selection from No. 50 and all later selections were made in isolated fields of strains homozygous for resistance, in order to prevent natural crossing with nonresistant plants. Most of the selections were made in the Imperial Valley where the long-growing season makes it easy to produce two generations each year, designated in the pedigree as spring and fall.

#### CHARACTERISTICS

Powdery Mildew Resistant Cantaloup No. 45 is generally entirely free from mildew in the Imperial Valley (figs. 1 and 2). In the coastal districts of California, where conditions are very favorable for powdery mildew, it usually shows some mildew late in the season, but the crop is not appreciably injured.

Powdery Mildew Resistant Cantaloup No. 45 is similar to Hale Best but somewhat later in maturing. The fruits are slightly oblong in shape, and very uniform in size, shape, and quality (fig. 3). The surface of the melons is well covered by moderately coarse netting with shallow furrows which are only partly covered by the netting.



In the Imperial Valley, the earliest harvested melons tend to be small with a gradual increase in size during the shipping season. There, this variety produces during midseason, when shipments are heaviest,

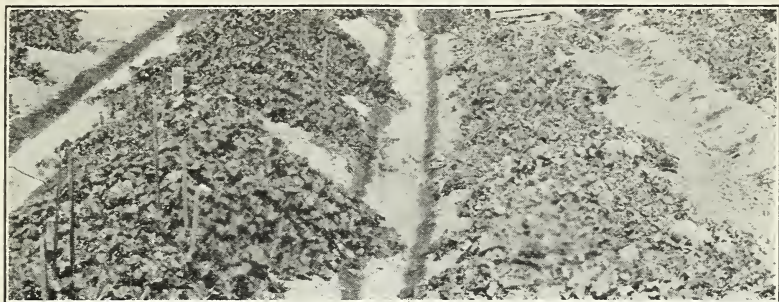


FIGURE 1.—At left, a few hills of Powdery Mildew Resistant Cantaloup No. 45 which are healthy and practically free from mildew; at right, comparable hills of Hale Best variety defoliated by mildew.

a high percentage of the most desirable sized fruits, i. e. those that pack 45 to a standard shipping crate. Usually, under Imperial Valley conditions, this variety has a tendency to produce melons too



FIGURE 2.—Large field of cantaloups in Imperial Valley; left foreground, two rows of Powdery Mildew Resistant Cantaloup No. 45 which are practically free from mildew; remainder of field Hale Best variety largely defoliated by mildew.

small for best commercial returns early in the season, and too large late in the season.

The flesh of No. 45 is even firmer in texture than that of Hale Best, and the color is salmon or orange and of a little lighter shade than some of the leading cantaloup varieties. In edible qualities it compares favorably with the important shipping varieties. The seed

cavity is small and well filled with seed (fig. 4). In many varieties and strains there is a tendency for liquid to collect in the cavity and for the seed to become loose during packing and shipping, which injures the quality and appearance of the melons on cutting. No. 45



FIGURE 3.—Powdery Mildew Resistant Cantaloup No. 45; field-run melons loose in standard shipping crates.

is particularly free from these defects although occasional melons show them. These characteristics promise to make it a superior shipping melon in districts adapted to its production. It has shown very satisfactory shipping qualities in extensive tests made from the

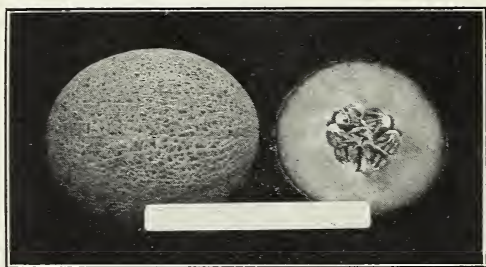


FIGURE 4.—Powdery Mildew Resistant Cantaloup No. 45, showing small, well-filled seed cavity.

Imperial Valley to eastern markets by the United States Department of Agriculture.

Powdery Mildew Resistant Cantaloup No. 45 seems much better adapted to harvesting field-ripe than most of the cantaloup varieties, having reached markets in all parts of the country in excellent marketing and eating condition when shipped field-ripe from Imperial Valley. The field-ripe condition is indicated by partial to complete

separation of the melon from the stem or peduncle. Growers know this as the stem-slip stage of maturity. It is highly advantageous to harvest cantaloupes only during the slip stage of maturity, both because stem slip is the only sure indication of full maturity, and because slip-stage melons generally have better eating qualities than those harvested before reaching slip stage. The better shipping qualities of No. 45, together with improved methods of precooling and refrigerating in shipments, promise to result in only field-ripe, or slip, melons being shipped from the leading early cantaloupe districts of the Southwest, and in the melons reaching the markets in uniformly good edible condition.

#### ADAPTATION

In 1936 nearly half the cantaloupe acreage in Imperial Valley was planted with this variety; the proportion has been considerably increased in 1937. So far this variety has been little tested outside of Imperial Valley, since powdery mildew is not at present an important factor in most other districts.

#### DISSEMINATION

The United States Department of Agriculture has no seed of Powdery Mildew Resistant No. 45 for distribution. It is in the trade, and seed can be procured from trade sources.



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